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July 18, 2019

Ref: 8ORA-N

Ms. Mary J. Rugwell, State Director
Bureau of Land Management
Attn: Ben Kniola, Assistant Field Manager
Lander Field Office
1335 Main Street
Lander, Wyoming 82520

Dear Ms. Rugwell:

The U.S. Environmental Protection Agency Region 8 has reviewed the Bureau of Land Management's April 2019 Draft Environmental Impact Statement (EIS), CEQ No. 20190059, that analyzes the Moneta Divide Natural Gas and Oil Development Project. We conducted this review pursuant to Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA). The Draft EIS evaluates the potential impacts associated with a proposal by Aethon Energy Operating LLC (Aethon) and Burlington Resources Oil and Gas Company LP (Burlington) to develop new and enhance existing facilities for the exploration and production of oil and gas resources from federal leases. The project area is located approximately 40 miles northeast of Riverton, Wyoming, and includes the development of up to 4,250 vertically and directionally drilled wells and supporting infrastructure. The BLM has not yet identified a preferred alternative among the three action alternatives.

The Draft EIS is described as "programmatic in nature" and states that it does not provide site-specific analyses because the exact location and design of project facilities were not known by the BLM when preparing the EIS (Draft EIS p. A-1). The Draft EIS identifies a number of integral project components that would require future, site-specific NEPA documents to be tiered to this EIS (Draft EIS pp. ES-5. ES-6). These components include the treated-water discharge pipeline(s) to Boysen Reservoir and the underground injection control (UIC) disposal wells along with associated roads, electric transmission, and pipeline network. Additionally, because the Clean Water Act Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the existing outfalls on Badwater and Alkali Creeks is currently being revised, the Draft EIS also did not include the information available to site-specifically evaluate project impacts associated with those outfalls. The EPA's recent comments on the WYPDES permit application (Frenchie Draw, WY0002062 renewal) are enclosed for reference as the BLM evaluates the associated site-specific impacts from discharge of up to 8.27 million gallons of produced water per day.

This project is predicted to yield a high volume of produced water, up to 58 million gallons per day. Produced water is a byproduct that is generated during oil and gas extraction and that is typically high in salt content and contains hydrocarbons as well as a diverse range of chemicals associated with well drilling, completion and maintenance activities. The Draft EIS identifies many challenges with

managing the project's produced water. The EPA considers the water quality effects associated with disposal of produced water as a principal environmental concern for the project.

The alternatives in the Draft EIS propose to dispose of treated produced water through a combination of new water pipeline(s) terminating at Boysen Reservoir, increased discharges to WYPDES permitted outfalls on tributaries of Boysen Reservoir, Underground Injection Control (UIC) wells, and evaporation ponds. The Draft EIS provides a general description of potential surface water quality and hydrology impacts from produced water WYPDES discharge including changes to stream channels and flow volumes, increased sediment loads, channel erosion, increased ion or salt concentrations, and contamination from hydrocarbons and other pollutants. The groundwater analysis also provides limited information about the potential effects of the proposed actions. The Draft EIS defers a more detailed, site-specific water quality effects analysis to future NEPA documents.

The EPA expects that the water disposal components that will be evaluated under tiered NEPA analyses would have significant environmental impacts based on project context and intensity:

- The volume of produced water associated with this project is exceptionally high.
- The effects and risks from the significant volume of produced water are highly uncertain without site-specific analyses.
- Produced water chemistry varies over time and space, and the water treatment process and permit requirements have not yet been specified, therefore the chemistry of water to be disposed/discharged is not yet known.
- Receiving waters including Boysen Reservoir and the Wind River (a designated Class I Outstanding Water) are drinking water resources with high economic and recreational value.
- The Draft EIS describes a need for up to 160 UIC wells; many would likely inject into underground sources of drinking water (USDWs) as defined by the Safe Drinking Water Act. The Groundwater Monitoring Report in the Draft EIS states that brine injection wells would require aquifer exemptions (Appendix O, p. 130). The ability of the injection zone to confine wastes over an area this large is uncertain without site specific assessment and there is an overlying aquifer that is currently used as a drinking water source.

There does not appear to be sufficient information available at this time to assess the potential environmental effects of the various water disposal options. If this information cannot be provided in the Final EIS, we recommend the associated environmental effects be evaluated in an environmental impact statement after the site-specific water management treatment and disposal details are available.

The Draft EIS predicts air quality impacts including exceedances of National Ambient Air Quality Standards, impacts to visibility and deposition, and risks from exposure to Hazardous Air Pollutants. Because the models include uncertainty and model performance evaluations indicate some results are biased low, air quality impacts may be greater than predicted by the Draft EIS. The enclosed Detailed Comments identify inconsistencies between the Draft EIS's conclusions and the information included in the appendices and offer opportunities to improve the accuracy of the impact analyses. We also identify available measures to avoid or reduce potentially significant air quality impacts.

The EPA no longer includes ratings in our Draft EIS comment letters. Information about this change and EPA's continued roles and responsibilities in the review of federal actions can be found on our website at: https://www.epa.gov/nepa/environmental-impact-statement-rating-system-criteria.

Please find enclosed EPA's Detailed Comments, which provide additional information and recommendations for evaluating and addressing the project's environmental and human health impacts. We appreciate the opportunity to participate in the review of the Draft EIS. If further explanation of our comments would be helpful as you prepare the Final EIS or plan for subsequent site-specific NEPA documents, please contact me at (303) 312-6704, or your staff may contact Melanie Wasco at (303) 312-6540 or wasco.melanie@epa.gov.

Sincerely,

Philip S. Strobel
Chief, NEPA Branch
Office of the Regional Administrator

Enclosures

Moneta Divide Natural Gas and Oil Development Project Draft EIS
EPA's Detailed Comments

Surface Water Quality

1. **No Action Alternative/Existing Conditions.** Page 2-20 of the Draft EIS states that the No Action alternative (Alternative 1) includes 34 wells that are "approved but not yet constructed," and additionally assumes Aethon will develop 80 wells and Burlington will develop 8 wells concurrent with the EIS preparation according to the May 2014 Interim Drilling Plan (Appendix C). The Draft EIS does not appear to establish existing conditions regarding the number of currently constructed wells nor use modeling to represent the future, undeveloped wells in the no action alternative.

Recommendations: To assess the effect of the no action alternative relative to existing conditions, we recommend that the Final EIS include the number of currently constructed and producing wells (i.e. verify that 830 wells is accurate, DEIS p. 1-5) and the number of new wells authorized in the Interim Drilling Plan. Then, predict the associated discharge volume, and the water quality in the affected water bodies (i.e., Alkali Creek watershed, Badwater Creek, Boysen Reservoir and the Wind River downstream of Boysen Reservoir).

2. **Produced Water Management – General.** Although Table 2-10 of the Draft EIS summarizes water disposal options under Alternative 2, it is difficult to distinguish how the companies will manage produced water under each of the action alternatives. All three action alternatives reference use of the Marlin well, and other disposal wells, to dispose of waste water to the Madison aquifer. Two of the action alternatives explicitly propose disposal to the Madison aquifer (alternatives 2 and 3) and alternative 4 does not preclude disposal within the Madison Disposal Area pursuant to existing permits (p. 2-65). All three action alternatives propose use of evaporation/retention ponds, treatment, discharge of untreated produced water, and discharge via either one or two pipelines to Boysen Reservoir. In the time since the June 2014 Water Management Plan was established, there have been several developments that seem likely to influence the disposal options. First, according to the Draft EIS, Aethon has identified a different approach to water treatment and disposal than originally proposed in the Plan of Development. Specifically, Aethon proposes discharging increased volumes of produced water at permitted discharge points. According to the Draft EIS, this approach could eliminate the need to directly discharge water into Boysen Reservoir via a treated water discharge pipeline. Second, because the Madison formation is not available at this time for disposal as a result of the Wyoming Oil and Gas Conservation Commission's (WOGCC) February 2016 denial of an aquifer exemption for injection of produced water, Aethon proposed a larger number of disposal wells targeting shallower geologic formations to accommodate subsurface disposal needs. Finally, there are no existing permits (either rights-of-way or WYPDES) for a pipeline(s) to Boysen.

Recommendations: The EPA recommends providing information in the Final EIS regarding the feasibility of these disposal components and update the June 2014 Water Management Plan to include recent project developments. If BLM determines that one or more disposal options is unlikely or infeasible, we support the BLM in its consideration to amend the Plan of Development and adjust the Proposed Action for the Final EIS as described on page 2-2 in the Draft EIS to more specifically describe the plan for managing produced water.

3. **Produced Water Management – WYPDES Permit Update**. The Draft EIS water quality analysis is based on the conditions of the existing, pre-expansion Clean Water Act (CWA) Wyoming Pollutant Discharge Elimination System (WYPDES) permit. On March 15, 2019 Wyoming DEQ proposed a revised WYPDES permit for Aethon to expand the discharge volumes by more that 8-times and change discharge requirements. Importantly, the existing permit would not enable the field expansion proposed in the Draft EIS.

The analysis in the Draft EIS is based on the existing WYPDES permit for the No Action alternative as well as the three action alternatives. The proposed revisions to the WYPDES permits are substantial and if included in the final permit, will result in changes to the volume and characteristics of discharge compared to the current permit.

Recommendations: We recommend that the Final EIS incorporate information from the updated WYPDES permit once the permit is finalized to more accurately assess the anticipated impacts of the project's produced water discharge against current baseline conditions. We provide additional details below in comment #6 regarding the draft WYPDES permit.

4. **Produced Water Management - "Treat to Class 1 Standards."** Alternatives 2 and 3 state that they will "treat 90 percent of produced water volumes to Class 1 standards using reverse osmosis technology (p. 2-69)." Alternative 4 specifies that it may not treat to Class 1 standards and may use other treatment methods (pp. 2-69; 2-70). The meaning of the phrase "treat to Class 1 standards" is unclear. It is not clear if the phrase "treat to Class 1 standards" is describing that treatment will achieve Class 1 standards as concentrations in the effluent at the point of discharge or as concentrations in the downstream Class 1 water, the Wind River below Boysen Reservoir.

Recommendations: The EPA recommends clarifying this phrase. The clearest way to convey the anticipated water quality is to provide numeric estimates of the constituent concentrations in the effluent. We recommend the Final EIS includes information regarding anticipated treatment technologies, including the 10 permanent and 20 temporary facilities, proposed under Alternative 2.

The EPA recommends the Final EIS clarify that any permitted discharge to waters of the State of Wyoming are required to meet water quality standards for all downstream waters, including the Class 1 Wind River downstream of Boysen. Page 2-64 states "Aethon may choose to not to treat water to the Class 1 standard proposed under Alternative 2 and may use other methods to meet Wyoming DEQ standards for surface discharge." The Clean Water Act §301(b)(1)(C), requires all point sources to implement controls necessary to achieve "*any more stringent limitation, including those necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations…or required to implement any applicable water quality standards established pursuant to this chapter."* The Final EIS should therefore document how the project will ensure compliance with this provision.

The EPA recommends the Final EIS assess and discuss the differences in the level of treatment and subsequent environmental effects between Alternatives 2 (and 3) and Alternative 4. We recommend this assessment include pollutant concentrations and loads at the points of discharge, pollutant concentrations and loads in Boysen Reservoir and any impacts to the Class I segment of the Wind River.

We also recommend the assessment include any environmental, human health, or regulatory effects from the project compared to existing conditions. Alternately, BLM could include a commitment to site-specifically assess these impacts in a tiered EIS document when sufficient details are available. We provide additional details below in paragraph #6 regarding effects from permitted discharges.

5. **Affected Environment – Water Resources**. The list of affected waters is very long. It is difficult to understand which waters are downstream of the various proposed discharges versus in the broader project area.

Recommendations: We recommend the Final EIS identify and delineate impacts to waters from the direct discharge(s) as well as other project activity that does not involve direct, permitted discharges to surface water such as truck traffic or road construction to better understand the location of these impacts.

We recommend that the text and Table 3-20 in the Final EIS add the Wind River downstream of Boysen Reservoir, which is a Class 1, Outstanding Water, on the list of affected waters.

6. **Environmental Consequences – Water Resources.** The Draft EIS provides some effects analysis for the hydrologic/sediment transport effects based on discharge requirements of the current WYPDES permit. Although the revised permit's modeling and impact analysis are incomplete, it includes more information regarding water quality changes and impacts associated with the project than the Draft EIS.

Recommendation: The EPA recommends the Final EIS incorporate analysis from the 2019 draft WYPDES permit to more accurately disclose the water quality effects (e.g., pollutant concentrations and loads) from the increased discharges at the current outfalls. We also recommend the Final EIS analyze impacts that were not analyzed through the permit analysis (refer to EPA's enclosed comments on the WYPDES permit).

7. **Mitigation and Monitoring.** The Draft EIS describes two water resource mitigation measures for all action alternatives, WA-1 and WA-2 (see pp. 4-183; 4-184). Both measures describe the general need to develop a monitoring and mitigation plan. WA-1 is for channel stability effects from increased discharge volume; the second is for effects from sediment runoff. WA-1 also references Appendix L, Channel Stability Monitoring and Mitigation Protocol within its text. WA-2 would reduce impacts on surface water resources from sediment runoff originating from well pads, roads, or other sites. A plan is important to ensuring protection of water resources.

Recommendations: We recommend that the Final EIS include monitoring and mitigation plan details. This will enable an evaluation of the plan's potential effectiveness and provide opportunities to suggest enhancements if warranted.

Appendix L and WA-1 appear to be required under the WYPES permits. We recommend that the Final EIS clarify whether the referenced measures in WA-1 and Appendix L provide protections beyond the permit requirements, and if so, it would be useful to describe any additional protections they provide.

8. **Appendix M, Water Resources Technical Report**

a. Appendix M presents data from USGS gages noting "Streamflow is measured at ten USGS flow/water quality stations (USGS gaging stations) in or near the analysis area (UGSG 2015) (p. 24)." The flow data are not recent, and per Appendix M and the USGS website, there are no current gaging stations in the production area. Streamflow data in that area range from 1947 to 1980.

Recommendations: We recommend that the Final EIS describe the data used to develop a baseline for the project. Given climatic and land use changes, we recommend that the Final EIS either note that the available flow data presented are likely not representative of either existing or baseline conditions or provide information to support that the flow data are reasonably representative. Because discharges from the existing development are already impacting the environment, we recommend the Final EIS address the context of current discharges and whether the baseline incorporates these discharges

It would be useful to describe what changes have occurred within the watershed that would affect hydrology since the gages were discontinued. For example, clarify whether increased oil and gas production has led to increased flow in either the Alkali Creek watershed or Badwater Creek mainstem through increased produced water discharges.

We recommend resolving an apparent contradiction in the Final EIS. Text on p. 28 describes "Discharge of produced water from oil and gas production has created perennial flowing tributaries to Alkali Creek and perennial reaches in Alkali Creek. Discharge water supports wetlands, wildlife and agriculture." Figures 5 and 6 reflect the Alkali Creek watershed as entirely intermittent. Given that flow data presented in the Draft EIS are outdated, we recommend that the BLM describe the available data and information (e.g., modeling, discharge monitoring reports) to characterize flows within the Alkali Creek and its tributaries and Badwater Creek and present that information consistently throughout the Final EIS and supporting documents.

b. The Draft EIS notes that EPA STORET data from Boysen Reservoir stations NLA06608-950 and WB163 were "deemed unusable due to errors in reporting units and were not included in the analysis presented in this report (App. M, p. 37)." Table 8 identifies EPA data from the following stations as unusable: G-48, 197, G-53, 205, 1048, 1049, NLA066608-0950, and WB163. We have reviewed these data and are unclear why BLM considers them unusable. The reporting units use parts per million (ppm) and milligrams per liter (mg/L), which are equivalent.

Recommendations: We recommend the Final EIS explain why the data from the stations identified in Appendix M, Table 8 are unusable. If BLM finds the data are usable, we recommend the baseline conditions and impact analyses incorporate these data.

9**. Boysen Reservoir Water Quality**

Alternatives 2-4 propose using pipeline(s) to discharge treated produced water directly into Boysen Reservoir. Boysen Reservoir serves a transient non-community drinking water system and is used extensively for primary and secondary contact recreation as well as fishing. Produced water from the project is a complex mixture, containing chemical additives that are known (listed in Appendix J), as well as naturally occurring formation constituents, and unknown constituents (e.g., proprietary chemicals, secondary compounds formed under subsurface conditions). Understanding the chemistry of this complex mixture and the effectiveness of the treatment system removal will be challenging. We

offer the following recommendations to help ensure that any discharges are protective of the reservoir and its uses.

Recommendations: The EPA recommends that the Final EIS include a discussion of the constituents in the treated produced water stream for the project based on the results of effluent monitoring for the Neptune treatment plant and any available information on their potential effects to aquatic environments or human health.

The EPA recommends the Final EIS or the tiered site-specific EIS identify the treatment technologies that will be used when it references "other appropriate technology" (DEIS p. 2-64). We also recommend the Final EIS or tiered EIS provide analytical data that identifies the treated produced water chemistry to help inform the understanding of potential impacts to Boysen Reservoir. The EPA also recommends that BLM consult with the tribes regarding possible impacts to water quality as well as any potential water quality rights that may be held by tribes.

Groundwater Quality

1. Groundwater Withdrawals and Injection

a. Results of groundwater modeling presented in the Groundwater Modeling Report (Appendix O, DEIS) indicate that little to no drawdown would occur as a result of groundwater withdrawals from production wells completed in the Lower Fort Union-Lance Formations (pp. 115–116) or freshwater wells completed in the Wind River aquifer (p. 127). For Alternative 2, the report states that limited increases in head of up to 20 feet were modeled for the Shotgun Member within the Shotgun Disposal Area (p. 116), but no head increases were observed for the overlying Wind River aquifer. For Alternative 4, head increases up to 120 feet were modeled for the Shotgun Member (p. 128), but again no changes in head occurred in the Wind River aquifer. Because no discrete confining layer is simulated between the Shotgun Member and Wind River aquifer, it is unclear why no head change is observed in the Wind River, especially when some brine is shown to enter the layer (pp. 116 and 127).

Recommendation: The EPA recommends that the model be reevaluated to verify that the results concerning the Wind River aquifer are correct.

b. As stated in the report, the model averages head over each 330-foot cell, and the lack of a discrete confining layer between the Shotgun and Wind River effectively causes the units to be simulated as a single, thick layer having variable hydraulic conductivity, which may be appropriate for the scale of the model. However, as injection intervals for individual wells would be selected where local confining zones exist, heads could increase to a much greater extent than indicated by the model. For example, a Theis calculation with superposition for a Shotgun well surrounded by 8 other wells spaced 0.5 mile apart (using model parameter values, the average injection rate of wells in year 15, and an average Shotgun thickness of 1,000 feet) indicates a potential maximum head increase that is an order of magnitude greater near the well than is indicated by the model. Although individual withdrawals are smaller than injection volumes, the same principal applies to withdrawals.

Recommendations: The EPA recommends conducting more site-specific analysis based on hydrogeologic data collected as new wells are drilled to more accurately assess individual and cumulative effects of injection and withdrawals.

We recommend confinement at each location should be assessed as injection wells are drilled, and the cumulative effects of nearby injection wells should be considered when determining the maximum allowable injection pressure for individual well permits.

Although the report text provides a limited description of injection and pumping effects, we recommend including maps in the Final EIS to illustrate changes in hydraulic head that result from injection and pumping in order to provide more clarity about the extent of effects.

c. Due to a lack of available data concerning hydrogeologic properties and groundwater levels for all hydrostratigraphic layers except the Wind River aquifer, the model in Appendix O lacks the detail necessary to make reliable predictions about the effects of production and injection wells. Given the lack of available data, it is important to quantify model uncertainty to clearly show the potential range of effects, both with respect to pressure changes and extent of injectate. Although the sensitivity analyses presented on pages 107–110 are useful for qualitative assessment of model uncertainty and the report acknowledges the model limitations, a quantitative assessment, including a range of predictions based on a valid range of input parameters would be important to communicating the true level of uncertainty associated with the simulations. Two references that provide more information about uncertainty analysis are Hill, 1998 (Methods and Guidelines of Effective Model Calibration) and/or Hill and Tiedeman, 2007, (Effective Groundwater Model Calibration: With Analysis of Data, Sensitivities, Predictions, and Uncertainty).

Recommendations: The EPA recommends conducting a quantitative assessment of model uncertainty and using additional information to aid calibration, such as baseflow to the Wind River, transient pumping levels in deeper wells, and/or the age date of Madison water indicated on page 107 with flow-path modeling. Adding particle tracking with MODPATH and providing figures showing the lateral and vertical extent of injectate also would provide better clarity concerning the full extent of injectate migration within the injection zone and adjacent layers.

Madison Disposal Area

The Madison aquifer has dominant permeability resulting from faults, fractures and cavernous areas that create challenges to accurately determine the fate, transport, and radius of influence of injected fluids. Increased pressure from injection could affect wells, springs, or seeps within the radius of the closest outcrop where the formation expresses itself at the surface. The lower part of the Amsden Formation overlying the Madison is characterized as a marginal aquifer, not a confining unit, and may not adequately confine injected fluids from potentially migrating to other aquifers. Although page 123 of the model report in Appendix O states that no increases in head extend into the Amsden Formation because it is modeled as an aquitard, the simulated hydraulic-conductivity value for the Amsden shown in Table 10 (p. 103) is three orders of magnitude lower than the minimum value reported from the literature, potentially representing the Amsden with greater confining ability than is warranted, especially for the lower Amsden. Page 126 of Appendix O states that the model indicates that brine concentrations of up to 10 percent of full strength would occur in the uppermost part of the Bighorn aquifer below individual wells in the Madison aquifer. Thus, the model does not demonstrate lower confinement for the Madison.

Recommendations: The EPA recommends reevaluating the model using a more representative hydraulic-conductivity value for the Amsden Formation or conducting additional analysis to better

estimate the potential spatial extent of effects to aquifers from injected fluids and the ability of injection zones to confine injected fluids across the full distance of migration. Because data are lacking, quantifying model uncertainty also is important to indicate the potential range of effects and provide proper context for the modeling results. We recommend this information be included in the Final EIS or tiered site-specific NEPA document.

Shotgun Disposal Area

The Shotgun member of the Fort Union Formation is a proposed injection zone for produced water and produced water concentrates. Our review identified several factors with the Shotgun Area that warrant attention in site-specific analyses or in the Final EIS:

- The Shotgun member lies immediately below the Wind River aquifer. There are domestic, irrigation, stock and industrial groundwater wells in the Wind River Aquifer throughout the Moneta Divide Project area, including the Shotgun Disposal Area.
- It appears that there may not be a continuous geologic confining unit separating the Shotgun Member and Wind River Aquifer in the Disposal Area to provide a barrier to fluid migration between the two formations.
- With the large volume of produced water projected to be injected, a pressure gradient could develop and lead to upwards fluid migration. The model provided in Appendix O predicts that fluids injected into the Shotgun Member could migrate into the overlying Wind River aquifer. For example, page 116 of the report states that a small concentration of brine (a byproduct remaining after treatment of produced water) appeared in the lowermost part of the Wind River aquifer. Page 130 also states that injection of brine may lead to noticeable increases of brine constituents in the disposal aquifers and surrounding aquifers. Although we are recommending these results should be reevaluated, and the uncertainty should be quantified, the analysis in the Draft EIS predicts that injection fluids may not be confined to the Shotgun.
- The Shotgun Disposal Area overlaps with the project's mineral production area. Production wells have the potential to act as a conduit from the production and injection zones unless they are specifically designed and built to avoid that issue.

Recommendations: The EPA recommends using additional data as production or injection wells are drilled in the area. Such data would enable a more detailed and accurate assessment of the local and cumulative effects of injection.

We recommend reviewing the construction of any existing production wells in the Shotgun area to ensure they have surface casing through the first reliable confining layer. This would ensure they cannot act as a conduit behind the production casing for fluid migration to USDWs from the injection zone.

We recommend new production wells be designed and constructed to avoid fluid migration to USDWs in the Shotgun Disposal Area.

Given the large number of UIC wells proposed, the large volumes of injectate and the geologic characteristics of the disposal area outlined above, the EPA recommends that a groundwater monitoring program for the Wind River Aquifer be developed and implemented for the Shotgun Disposal Area to provide early detection should injected fluids migrate into the Wind River Aquifer.

2. Surface Casing

The June 2014 Water Management Plan states surface casing will be set to a "depth of approximately 2,500 ft." and continues "The depth to which surface casing is set is determined by the BLM and WOGCC prior to well construction. Fresh water must be used to drill the surface casing portion of the well to prevent contamination of shallow aquifers. Under the Proposed Action, fresh water would be obtained from existing (or new) fresh water wells, or from facilities which would treat readily available produced water to Class 1 standards. The quality of this "highly treated produced water" would meet or exceed quality of fresh water obtained from wells or other fresh water sources." (Appendix K, page 7) There are two concerns with this proposal related to construction outlined below.

a. Depth of Surface Casing

Figure 21 in the Groundwater Modeling Report (Appendix O) shows that the Wind River Aquifer extends from about 2,500–6,000 feet below surface across the Shotgun Disposal Area. In most of this area, the depth exceeds the proposed depth that the surface casing will be set. In order to isolate the Wind River Aquifer, cement on the backside of the production casing needs to be brought up at a minimum of 50 feet behind the surface casing shoe. The intersection between the Wind River Aquifer and Shotgun Member of the Fort Union Formation are interfingered with shales that vary in thickness and horizontal extent (Keefer, 1965). Thus, there is no continuous barrier to flow between the Shotgun and Wind River, and depths to shale in the Shotgun Member vary.

Recommendations: The EPA recommends the Final EIS provide a general schematic and discussion that demonstrates how the production and disposal wells will be designed to meet BLM On-Shore Order No.2. Also, given that strata in the project areas dip, we recommend the Final EIS illustrate the geology instead of specific depths to demonstrate how the Wind River aquifer will be isolated from the Shotgun Member.

b. Water Used for Drilling Surface Casing

Under Alternatives 2 and 3, fresh water would be obtained from existing (or new) fresh water wells, or from facilities which would treat readily available produced water to Class 1 standards. Studies have shown that water soluble organics are not removed in reverse osmosis treatment. Under Alternative 4, fresh water will be used for all drilling and produced water will be recycled for stimulation activities. The concerns about data gaps around produced water chemistry and treatment efficacy are highlighted in the surface water comments. Demonstration of the effective removal of these constituents of concern should be a first step in establishing whether the treated produced water should be used to drill surface casing.

Recommendations: We recommend that the Final EIS provide additional analytical data that represent the chemistry of the treated produced water. We also recommend using fresh water for drilling surface casing and using treated produced water for drilling through non-USDWs and stimulation activities. The use of treated produced water where appropriate will reduce the consumption of fresh water resources.

<u>Wetlands</u>

a. Because this EIS does not include site-specific locations for project facilities, there is no site-specific wetland impact assessment.

Recommendations: The EPA recommends that subsequent, site-specific NEPA evaluations conducted during the Application for Permit to Drill (APD) and right-of-way (ROW) application process include detailed information on potentially impacted aquatic resources including wetland acreages and channel lengths, habitat types, values, and functions.

If impacts to surface waters and wetlands are determined to be unavoidable (i.e., that there is no other practical option) the EPA recommends that the subsequent tiered NEPA analyses include a discussion on how this determination was made. This could help facilitate potential Clean Water Act (CWA) Section 404 permitting review if permits from the U.S. Army Corps of Engineers for the discharge of dredged or fill material into waters of the U.S are necessary for the project. This is especially true if the anticipated activities will require an individual CWA Section 404 permit and evaluation pursuant to the CWA 404 (b)(1) Guidelines (40 CFR Part 230).

We recommend that the Final EIS include a discussion of the potential indirect effects to aquatic resources from each alternative, and that any tiered, site-specific NEPA analyses should also evaluate and, to the extent possible quantify, direct and indirect impacts to wetlands and other aquatic resources.

b. The Draft EIS discloses that Alternative 4 would have fewer impacts to surface water hydrology, riparian area and wetland areas, primarily because it does not include the Treated Water Discharge Pipeline along Badwater and Poison Creeks and would have fewer linear watercourse crossings overall.

Recommendation: If a decision is made to pursue a pipeline option, it will be important to evaluate potential pipeline corridors for their effects to aquatic resources and whether CWA Section 404 permits will be required.

Air Quality

We recognize the BLM's efforts in coordinating with us during the preparation of the air quality analysis over the course of this project. The Draft EIS (p.4-8 to p.4-73) and supporting documents (Appendix D, p.D-72, D-73; Appendix C of Attachment D to Appendix D, p.331 to p.333 and p.335 to p.340) predicts the project will cause potential adverse health effects from NO_2, PM_{10}, $PM_{2.5}$, and HAP concentrations for personnel working or residing in or nearby to the Project Area. The Draft EIS also predicts reduced visibility (greater than 0.5 deciviews) and increased atmospheric deposition of nitrogen in certain nearby Class I and Class II sensitive areas (p 4-67 to 4-70).

We identified areas of the analysis that make it challenging to interpret the model results and understand the potential air quality impacts resulting from this project. Specifically, the air quality assessment included in Chapter 4 of the Draft EIS (1) does not fully disclose the predicted maximum air quality impacts resulting from the project's activities; (2) includes characterizations of the emission sources in the modeling that may under estimate anticipated project activities and equipment; and (3) uses modeling approaches that do not align with the EPA's Guideline on Air Quality Modeling. Given these issues, the representativeness of the model results is highly uncertain. These issues could cause the model to under-predict the air quality impacts resulting from the project and misrepresent the location of the maximum impacts relative to the project area. Notwithstanding these concerns, there are predicted near-field and far-field air quality impacts that warrant further consideration.

EPA offers the following recommendations to address the project's human health, visibility and deposition impacts, as well as recommendations to more clearly disclose impacts in the Final EIS.

1. **NAAQS Exceedances**: Our review identified an inconsistency between the Air Quality Modeling Report (in Appendix D) and the summary of that report in Chapter 4 regarding NAAQS exceedances. The Draft EIS discloses the potential for exceedances of the NAAQS resulting from Tier 1 engine completion activities and notes that Tier 2 engines will not avoid exceedances of the Wyoming Ambient Air Quality Standard (WAAQS) for annual PM_{10} but that all other NAAQS exceedances will be avoided. (p. 4-44). This appears to contradict Table 4-15 for 24-hour PM_{10} and the analysis of predicted exceedances in the Modeling Report (Appendix B and C to Attachment D), where the analysis shows that Tier 2 engines do not avoid exceedances of 24-hour PM_{10}, 24-hour $PM_{2.5}$ or 1-hour NO_2 NAAQS during the well completion activities.

Recommendations: We recommend correcting the text in Chapter 4 of the Final EIS to reflect that Tier 2 hydraulic fracturing engines are predicted to cause exceedances of these standards. Further, given the uncertainty in the modeling, these predicted exceedances could be under-predicted by the model. We recommend BLM and the operators consider available mitigation that could avoid human health effects from completion activities such as the use Tier 4 fracturing pump engines. Additionally, we recommend the Final EIS includes a fugitive dust plan to avoid predicted PM_{10} NAAQS exceedances during construction activities. In addition to protecting human health, these measures would also be expected reduce impacts to visibility, deposition, and diesel engine HAP concentrations.

2. **Uncertainty in Emission Source/Equipment Assumptions**: The emission inventory and air quality modeling analysis for this EIS appear to include only one natural gas fired drill rig engine (1396 hp at 100% load). Available specifications for drill rigs utilizing the GE Jenbacher J320 GS list the use of three or four engines.

Recommendations: We recommend confirming in the Final EIS the number of drill rig engines that will be used for these wells and whether any assumptions in the emission inventory result in combining engines within the emission factor. If not, we recommend amending the inventory to include a more representative number of engines and describe the expected impact on model results.

Based on the information in the Draft EIS for hydraulic fracturing injection volumes and duration, as well as information in the emission inventory, it appears that the emission inventory and impact analysis may underestimate the necessary hydraulic horsepower. We expect updates to the emission estimates and model input assumptions would result in higher emissions and potentially greater impacts to air quality.

Recommendations: We recommend that the BLM add information to the Air Quality Modeling Report in the Final EIS including fracturing fluid injection rate, fracturing pressure, and pumping duration to confirm the necessary hydraulic horsepower and associated emissions. If these emissions are found to differ substantially from those used in the models, we recommend identifying the expected impact of this adjustment on model results in Chapter 4.

3. **Near-Field Modeling Receptor Network**: The receptor points used in the model to predict near-field impacts did not cover areas where the general public may have access during the development of the

project. These areas, particularly near the well pads, do not typically have barriers preventing general public access and may have levels of air pollution that exceed the health-based NAAQS. It is difficult to determine the magnitude of the elevated levels of air pollution in these areas without additional modeling that includes receptors in these areas.

Recommendations: We recommend the Final EIS note that areas with public access were not fully assessed in the air quality modeling, particularly nearby the well pad boundaries. Given that the impacts are unknown, we also recommend that the BLM identify mitigation options that would discourage the public from these areas not covered by the air quality modeling or reduce pollutant emission rates.

4. **Uncertainty Resulting from Near-Field Analysis Approach**: Chapter 4 of the Draft EIS presents predicted near-field impacts in a manner that is not consistent with EPA's Guideline on Air Quality Modeling related to modeling emissions scenarios and statistical methods for determining predicted exceedances of the NAAQS. For example, the emissions profiles are not representative of all the sources consistently across all the model years for each scenario. When the analysis approach aligns with the EPA's guidance, the near-field impacts could increase as much as about a factor of 2 (using available information) over the results presented in Chapter 4. While the BLM discloses the results for scenarios preferred by the EPA in supporting documents, these results are not used in the Draft EIS to support the project's development and mitigation decisions, nor easily available and discernable to the public, decision-makers, and other Agencies to understand the potential impacts (see Appendix C of Attachment D to Appendix D of the Draft EIS).

Recommendation: We recommend that the Final EIS clearly summarizes the results found in the supporting documents. The analysis approach preferred by the EPA preserves the statistical basis of the analysis and provides a more accurate representation of the model results for demonstrating compliance of the NAAQS.

5. **Predicted HAPs Impacts**: The Draft EIS discloses long-term exposure risk of cancer due to HAPS associated with evaporation ponds (37-in-one million), disposal well operation (2.6 to 3.4-in-one million), and oil and gas production at well pads (1.2 to 1.4-in-one million). The Draft EIS also discloses a necessary distance to one-in-one million risk for evaporation ponds of up to 2 km. Due to the uncertainty in the air quality modeling, the risks could be under-predicted by the model.

Recommendation: We recommend evaluating methods to reduce emission rates of HAPs or evaluating appropriate buffers to limit the risk of cancer to the public to below one-in-one million, similar to what the BLM prepared for the Continental Divide-Creston Natural Gas Development Project and the Draft EIS for the Converse County Oil and Gas Project.

6. **Uncertainty in Ozone, Secondary $PM_{2.5}$, and AQRVs Analysis:** Chapter 4 of the Draft EIS does not consider the uncertainty in the model performance when interpreting the potential adverse impacts from ozone, secondary $PM_{2.5}$, and Air-Quality Related Values (AQRVs). For instance, the Model Performance Evaluation (MPE) indicates that the model bias is low for ozone and its precursors, which suggests that the ozone impacts are under-predicted by the model. Further, the statistical analysis of the speciated $PM_{2.5}$ species indicates poor model performance or suggests a large uncertainty in the predicted secondary $PM_{2.5}$ and AQRV impacts. The MPE also lacks a comprehensive evaluation during the winter months (monthly analyses of November through March). Without additional analyses to

examine these issues, it is difficult to determine the model's ability to predict air quality impacts for ozone and secondary $PM_{2.5}$, and subsequently the far-field cumulative impacts and impacts to AQRVs. While the EIS discloses this information in the Air Quality Modeling Report (see Attachment C of Appendix D), it may not be easily available and discernable to the public, decision-makers, and other Agencies to understand the potential impacts to air quality and to inform decisions about the project's development.

Recommendation: We recommend the Final EIS impact analysis includes a summary of the uncertainty and the expected effects on predicted impacts.

7. **Discussion of Cumulative Visibility Improvements**: Chapter 4 predicts improved cumulative visibility at Class I and Class II areas within this region when comparing the model results from the base year to the future-year projections. The predicted visibility improvement stems from improvements expected under the Regional Haze Rule and other emission reductions anticipated through federal and state regulations (e.g., reductions from vehicle emission standards). This comparison does not assess the differences in visibility impacts between alternatives. It would be useful to understand the difference between any future year alternatives assessed by the photochemical grid model and the no-action alternative to illustrate whether the alternatives would have differing visibility effects.

Recommendation: For the Final EIS, we recommend Chapter 4 include a comparison of the No-Action alternative to each future-year alternative (e.g., Proposed Action) and discuss the results to understand the effects of the proposed development on progress in visibility improvement and to inform the project's development.